UTAH DEPARTMENT OF TRANSPORTATION

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PMW Wheel Tracking Machine

DESCRIPTION

The Pavement Wheel Tracker is a device for testing the wearability and moisture damage potential of asphalt mixes by simulating roadway conditions. The test provides information about the rate of permanent deformation from a moving, concentrated load. The potential for moisture damage is also evaluated since the specimens are submerged in temperature controlled water during loading. It uses two Linear Value Displacement Transducers (LVDT's) to measure the deformation of two separate samples at eleven points across each sample. Two wheels (one on each sample) apply 158 pounds (± 1.0 lb) of pressure at contact points and pass repetitively over the samples for up to 20,000 cycles. If the maximum allowed deformation is reached before 20,000 passes, the wheel will lift off the failed sample but continue testing the second sample. Test results are compiled in a Microsoft Access database application which provides several means of reporting results.

Figure 1. PMW Wheel Tracking Machine

CALCULATIONS AND REPORTING

Results of the wheel tracker tests are plotted on a graph displaying rut depth (typically in millimeters) versus the number of passes for each test. A line is plotted for the left wheel, the right wheel, and an average of both wheels.

An examination of the graph can reveal the number of passes to failure, the maximum rut depth occurring, and a stripping inflection point.

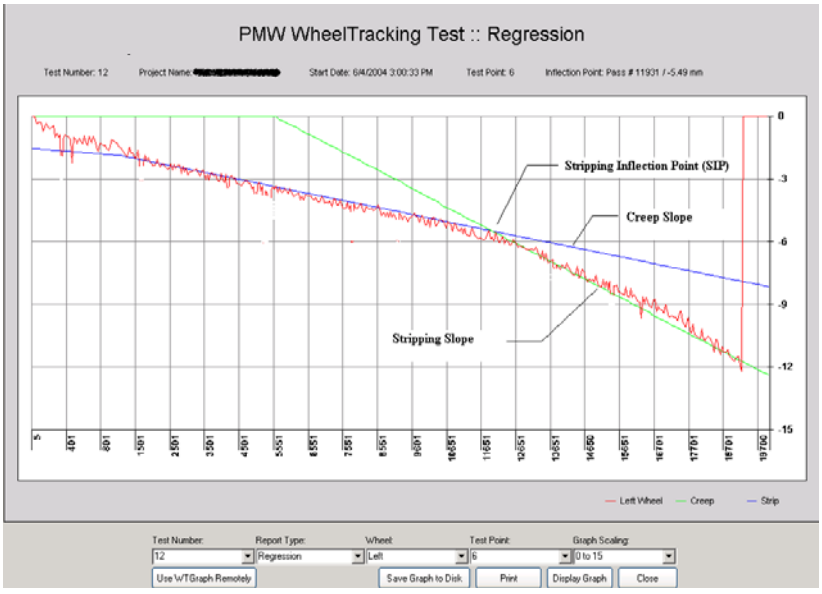

Figure 2. Regression Report Graph

Reports of test data are obtained through the WTGraph software utility. All test data is stored in an Access database called PMW4.mdb. The WTGraph utility provides eight report options. With the report options, data may be manipulated in several ways including a regression report, a wheel tracking report, and a wheel tracking test.

The most commonly used **wheel tracking report** will display a dialog box requesting information on the lab conducting the test, the project number, the project engineer, the

asphalt grade, and other identifying data. The resulting report is a one-page sheet displaying this data along with a plot of both wheels and a plot of the average. The maximum rut depth for both wheels and an average of those depths is displayed prominently along with a box declaring whether the test passed or failed. This is a useful report for an at-a-glance evaluation of a wheel tracker test.

The **regression report** is a plot of the creep slope, the stripping slope, and the resulting stripping inflection point (SIP). This is a useful report for evaluating failed specimens. Use of the report requires the operator to examine the graph and select two points that represent a linear creep slope and two points that represent a linear stripping slope. The software will then plot both lines and give an SIP and the number of passes to the point (see figure 2). The report can be used to evaluate when stripping of a sample occurs.

The **wheel tracking test** simply plots the passes versus the rutting depth for the left wheel, the right wheel and the average. This is the same graph produced by the wheel tracking report without all the other report information. Use this report as a quick view of the test results.

Parameters for each of the reports may be set by selecting the drop down boxes on the main reports screen. (see figure 3.)

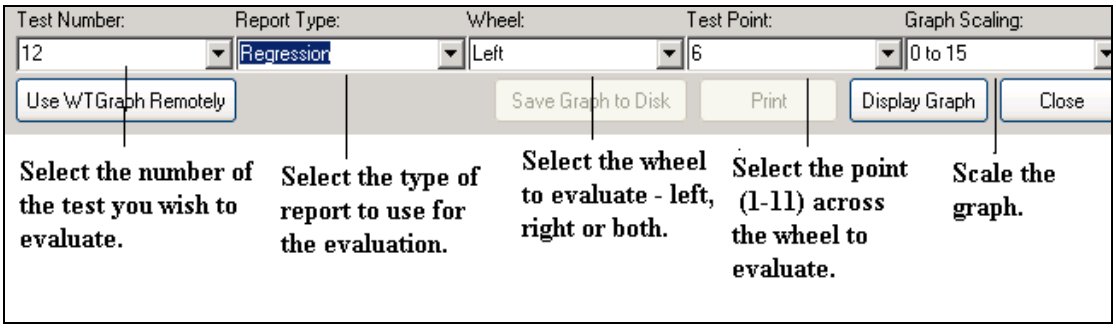

Figure 3. Report Parameters

OPERATING DETAILS

A Pavement Wheel Tracking Machine is located in each of the region material labs and in the UDOT Central Lab. A successful test of 20,000 passes takes approximately 6.5 hours (52 passes/minute) to complete. The Wheel Tracker is used for verification of asphalt mixes before, during and after construction. In-place samples are tested on 12 inch diameter cores. Currently, the **approximate cost** of a Pavement Wheel Tracking Machine is $60,000.

RELATED INFORMATION

- UDOT Materials Manual Section 990 – *Method of Test for Hamburg Wheel Track Testing* **http://www.dot.state.ut.us/index.php/m=c/tid=644**
- AASHTO T 324 - Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)

FURTHER INFORMATION

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